

l = [4,5,3,7,6,9,3,2,1,1,3,4]

Insertion Sort:

Loop	Comparisons	Swaps	Intermediary List Result
1	0	0	[4, 5, 3, 7, 6, 9, 3, 2, 1, 1, 3, 4]
2	1	0	[4, 5, 3, 7, 6, 9, 3, 2, 1, 1, 3, 4]
3	2	2	[3, 4, 5, 7, 6, 9, 3, 2, 1, 1, 3, 4]
4	3	0	[3, 4, 5, 7, 6, 9, 3, 2, 1, 1, 3, 4]
5	4	1	[3, 4, 5, 6, 7, 9, 3, 2, 1, 1, 3, 4]
6	5	0	[3, 4, 5, 6, 7, 9, 3, 2, 1, 1, 3, 4]
7	6	6	[3, 3, 4, 5, 6, 7, 9, 2, 1, 1, 3, 4]
8	7	7	[2, 3, 3, 4, 5, 6, 7, 9, 1, 1, 3, 4]
9	8	8	[1, 2, 3, 3, 4, 5, 6, 7, 9, 1, 3, 4]
10	9	9	[1, 1, 2, 3, 3, 4, 5, 6, 7, 9, 3, 4]
11	10	6	[1, 1, 2, 3, 3, 3, 4, 5, 6, 7, 9, 4]

12	11	7	[1, 1, 2, 3, 3, 3, 4, 4, 5, 6, 7, 9]
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Selection Sort:

Loop	Comparisons	Swaps	Intermediary List Result
1	11	1	[1, 5, 3, 7, 6, 9, 3, 2, 4, 1, 3, 4]
2	10	1	[1, 1, 3, 7, 6, 9, 3, 2, 4, 5, 3, 4]
3	9	0	[1, 1, 2, 7, 6, 9, 3, 3, 4, 5, 3, 4]
4	8	1	[1, 1, 2, 3, 6, 9, 7, 3, 4, 5, 3, 4]
5	7	1	[1, 1, 2, 3, 3, 9, 7, 6, 4, 5, 3, 4]
6	6	1	[1, 1, 2, 3, 3, 3, 7, 6, 4, 5, 9, 4]
7	5	0	[1, 1, 2, 3, 3, 3, 4, 6, 7, 5, 9, 4]
8	4	0	[1, 1, 2, 3, 3, 3, 4, 4, 7, 5, 9, 6]
9	3	1	[1, 1, 2, 3, 3, 3, 4, 4, 5, 7, 9, 6]
10	2	0	[1, 1, 2, 3, 3, 3, 4, 4, 5, 6, 9, 7]

11	1	1	[1, 1, 2, 3, 3, 3, 4, 4, 5, 6, 7, 9]
12	0	0	[1, 1, 2, 3, 3, 3, 4, 4, 5, 6, 7, 9]

Bubble Sort:

Loop	Comparisons	Swaps	Intermediary List Result
1	11	3	[4, 3, 5, 6, 7, 3, 2, 1, 1, 3, 4, 9]
2	11	5	[3, 4, 5, 6, 3, 2, 1, 1, 3, 4, 7, 9]
3	11	4	[3, 4, 5, 3, 2, 1, 1, 3, 4, 6, 7, 9]
4	11	3	[3, 4, 3, 2, 1, 1, 3, 4, 5, 6, 7, 9]
5	11	2	[3, 3, 2, 1, 1, 3, 4, 4, 5, 6, 7, 9]
6	11	2	[3, 2, 1, 1, 3, 3, 4, 4, 5, 6, 7, 9]
7	11	1	[2, 1, 1, 3, 3, 3, 4, 4, 5, 6, 7, 9]
8	11	1	[1, 1, 2, 3, 3, 3, 4, 4, 5, 6, 7, 9]
9	11	0	[1, 1, 2, 3, 3, 3, 4, 4, 5, 6, 7, 9]

10	11	0	[1, 1, 2, 3, 3, 3, 4, 4, 5, 6, 7, 9]
11	11	0	[1, 1, 2, 3, 3, 3, 4, 4, 5, 6, 7, 9]
12	11	0	[1, 1, 2, 3, 3, 3, 4, 4, 5, 6, 7, 9]

Counting Sort:

Step	Action	Count Array (1-9)	Sorted Array Construction
1	Initialize Count Array	[0, 0, 0, 0, 0, 0, 0, 0, 0]	-
2	Count occurrences	[2, 1, 3, 2, 1, 1, 1, 0, 1]	-
3	Compute Cumulative Sum	[2, 3, 6, 8, 9, 10, 11, 11, 12]	-
4	Place 1s	-	[1, 1, -, -, -, -, -, -, -]
5	Place 2	-	[1, 1, 2, -, -, -, -, -, -]
6	Place 3s	-	[1, 1, 2, 3, 3, 3, -, -, -, -]
7	Place 4s	-	[1, 1, 2, 3, 3, 3, 4, 4, -, -, -, -]
8	Place 5	-	[1, 1, 2, 3, 3, 3, 4, 4, 5, -, -, -, -]

9	Place 6	-	[1, 1, 2, 3, 3, 3, 4, 4, 5, 6, -, -]
10	Place 7	-	[1, 1, 2, 3, 3, 3, 4, 4, 5, 6, 7, -]
11	Place 9	-	[1, 1, 2, 3, 3, 3, 4, 4, 5, 6, 7, 9]

Merge Sort:

Step	Action	Sublist(s) Before Action	Sublist(s) After Action	Notes
1	Start	[4, 5, 3, 7, 6, 9, 3, 2, 1, 1, 3, 4]	-	Original list
2	Divide	[4, 5, 3, 7, 6, 9, 3, 2, 1, 1, 3, 4]	[4, 5, 3, 7, 6], [9, 3, 2, 1, 1, 3, 4]	Split into two halves
3	Divide Left	[4, 5, 3, 7, 6]	[4, 5, 3], [7, 6]	Split left half
4	Divide Right	[9, 3, 2, 1, 1, 3, 4]	[9, 3, 2], [1, 1, 3, 4]	Split right half
5	Divide Left-Left	[4, 5, 3]	[4], [5, 3]	Split left of left half
6	Sort & Merge Left-Left	[5, 3]	[3, 5]	Sort and merge [5, 3]
7	Merge Left-Left with Left	[4], [3, 5]	[3, 4, 5]	Merge [4] with [3, 5]

8	Divide Left-Right	[7, 6]	[7], [6]	Split right of left half
9	Merge Left-Right	[7], [6]	[6, 7]	Merge [7] and [6]
10	Final Merge Left Half	[3, 4, 5], [6, 7]	[3, 4, 5, 6, 7]	Merge sorted left halves
11	Divide Right-Left	[9, 3, 2]	[9], [3, 2]	Split left of right half
12	Sort & Merge Right-Left	[3, 2]	[2, 3]	Sort and merge [3, 2]
13	Merge Right-Left with Right	[9], [2, 3]	[2, 3, 9]	Merge [9] with [2, 3]
14	Divide Right-Right	[1, 1, 3, 4]	[1, 1], [3, 4]	Split right of right half
15	Sort & Merge Right-Right	[1, 1], [3, 4]	[1, 1, 3, 4]	No sorting needed, already sorted
16	Final Merge Right Half	[2, 3, 9], [1, 1, 3, 4]	[1, 1, 2, 3, 3, 4, 9]	Merge sorted right halves
17	Final Merge	[3, 4, 5, 6, 7], [1, 1, 2, 3, 3, 4, 9]	[1, 1, 2, 3, 3, 3, 4, 4, 5, 6, 7, 9]	Merge all to get the sorted list

Quick Sort with the last element as the pivot:

Step	Action	Sorted	Pivot	Notes	Sublists
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1	Start	[4, 5, 3, 7, 6, 9, 3, 2, 1, 1, 3, 4]	4	Initial list	-
2	Partition	[3, 2, 1, 1, 3, 3, 4, 5, 7, 6, 9, 4]	4	Move <4 to left, >4 to right	[3, 2, 1, 1, 3, 3], [5, 7, 6, 9, 4]
3	Recur Left	[1, 1, 2, 3, 3, 3]	3	Sort elements left of pivot 4	[1, 1, 2], [3, 3, 3]
4	Recur Right	[4, 5, 7, 6, 9]	4	Sort elements right of pivot 4	[4], [5, 7, 6, 9]
5	Sort Left	[1, 1, 2]	2	Sort elements left of pivot 3	[1, 1], [2]
6	Sort Right	[5, 7, 6, 9]	9	Sort elements left of pivot 9	[5, 7, 6], [9]
7	Sort Left	[5, 6, 7]	6	Sort elements left of pivot 9	[5], [6, 7]
8	Combine	[1, 1, 2, 3, 3, 3, 4,	-	Combine all sorted	-

		5, 6, 7, 9]		sublists	
9	Insert 4	[1, 1, 2, 3, 3, 3, 4, 5, 6, 7, 9, 4]	4	Insert 4 in correct sorted position	-
10	Completed	[1, 1, 2, 3, 3, 3, 4, 4, 5, 6, 7, 9]	-	Final sorted list	-